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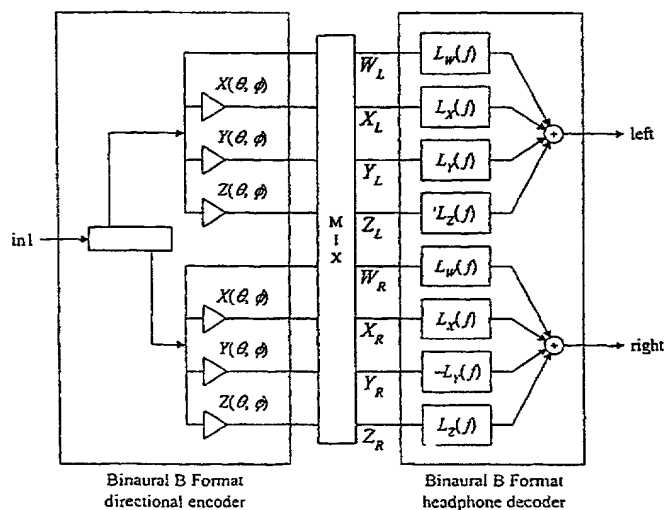
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(54) Title: **METHOD AND APPARATUS FOR THREE-DIMENSIONAL AUDIO DISPLAY**



(57) Abstract: This invention addresses sound recording and mixing methods for 3-D audio rendering of multiple sound sources over headphones or loudspeaker playback systems. Economical techniques are provided, whereby directional panning and mixing of sounds are performed in a multi-channel encoding format which preserves interaural time difference information and does not contain head-related spectral information. Decoders are provided for converting the multi-channel encoded signal into signals for playback over headphones or various loudspeaker arrangements. These decoders ensure faithful reproduction of directional auditory information at the eardrums of the listener and can be adapted to the number and geometrical layout of the loudspeakers and the individual characteristics of the listener. A particular multi-channel encoding format is disclosed, which, in addition to the above advantages, is associated with a practical microphone technique for producing 3-D audio recordings compliant with the decoders described.

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